16737

RKI Exploration & Production LLC

210 Park Avenue, Suite 900, Oklahoma City, OK 73102
405-949-2221 Fax 405-949-2223

June18, 2014

Cole Anderson
NSR Program Manager
Department of Environmental Quality, Air Quality Division
Herschler Building, 2-E
122 West 25th Street
Cheyenne, WY 82002

Re: *Air Permit Application*
RKI Exploration & Production LLC
Cottonwood Draws Unit 12 Pad Genset

Dear Mr. Anderson:

Pursuant to the requirements of the Wyoming Air Quality Standards and Regulations New Source Review permitting program and the associated Chapter 6 Section 2 (C6 S2) Oil and Gas Production Facilities Permitting Guidance document dated September 2013, RKI Exploration & Production LLC submits this *C6 S2 Application for an Air Quality Permit* for the subject facility.

The proposed Cottonwood Draw Unit 12 Pad Gensets will be located on the existing pad with the wellsite production equipment for the Cottonwood Draw Unit 38-72-12 1H. The wellsite equipment is permitting under AP-14071.

With this application, two (2) 1456 kW natural gas fired electric generators will be added to the site.

Should you have any questions concerning this request, please contact me at the phone number or email address listed in the application.

Sincerely,

Jeffrey L. Ingerson
Senior Air Permitting Engineer

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division
Oil and Gas Production Facilities C6 S2 Permit Application
Application Cover Sheet

submit (1) one signed original copy AND (1) one electronic copy of the application OR (3) paper copies, one w/ original signature

Company Name: RKI Exploration & Production, LLC

Facility Name: Cotttonwood Draw Unit 12 Pad Genset

API Number:

For more than one well, list additional wells & associated API numbers on Form AQD-OG8.

OFFICIAL CONTACT PERSON

Name: Jeffrey L. Ingerson Title: Senior Air Permitting Engineer

Address: 210 Park Avenue, Suite 900 Oklahoma City, Oklahoma 73102

Telephone: (405) 987-2181 Fax: (405) 949-2223 E-mail: jingerson@rkixp.com

LOCATION

County: Converse County

Legal Description: 1/4 1/4 se se Section 12 T 38N R 72W

Latitude: 43.27704 Longitude: -105.44418

FACILITY INFORMATION

Type of Facility: Single Well PAD X Central Tank Battery

Type of Application: New Construction Modified Facility X

First Date of Production 08.28.2012 Date of Modification When permitted

Producing Field Name: Cottonwood Draw Unit

Producing Formation(s): Various

Existing Air Quality Permit / Waiver Numbers: CT-14071

Pending Air Quality Permit Application Numbers: NA

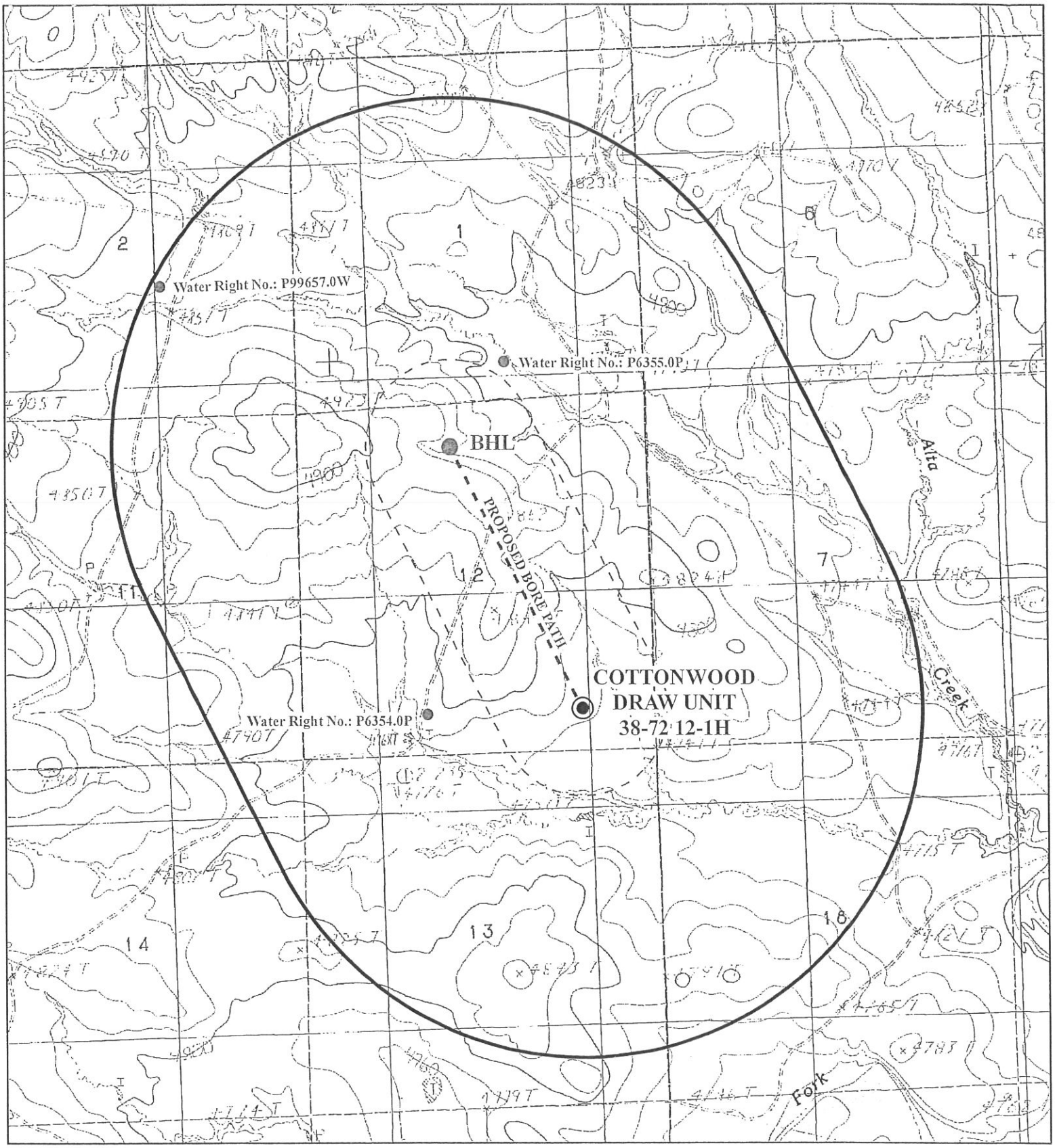
I, Jeffrey L. Ingerson (Responsible Official) Senior Air Permitting Engineer (Title)

state that I have knowledge of the facts herein set forth and that the same are true and correct to the best of my knowledge and belief. I further certify that the emission rates listed on this certification reflect the anticipated emissions due to the operation of this facility. The facility will operate in compliance with all Wyoming Air Quality Standards and Regulations.

Signature [signature] Signature Required Date 6/18/14

FORM AQD-OG1

Application Coversheet September 2013



Proposed Well Location ● Existing Oil Well ● Existing Water Well ☐ 1-mile Radius ⋯ 1/4-mile Radius

LOCATION:
COTTONWOOD DRAW UNIT 39-72 24-1H
660' FSL &1162' FEL
15' SOUTH & 476' WEST OF CENTER
SE 1/4 SE 1/4 OF SECTION 12,
T 38 N - R 72 W, 6TH P.M.,
CONVERSE COUNTY, WYOMING

N

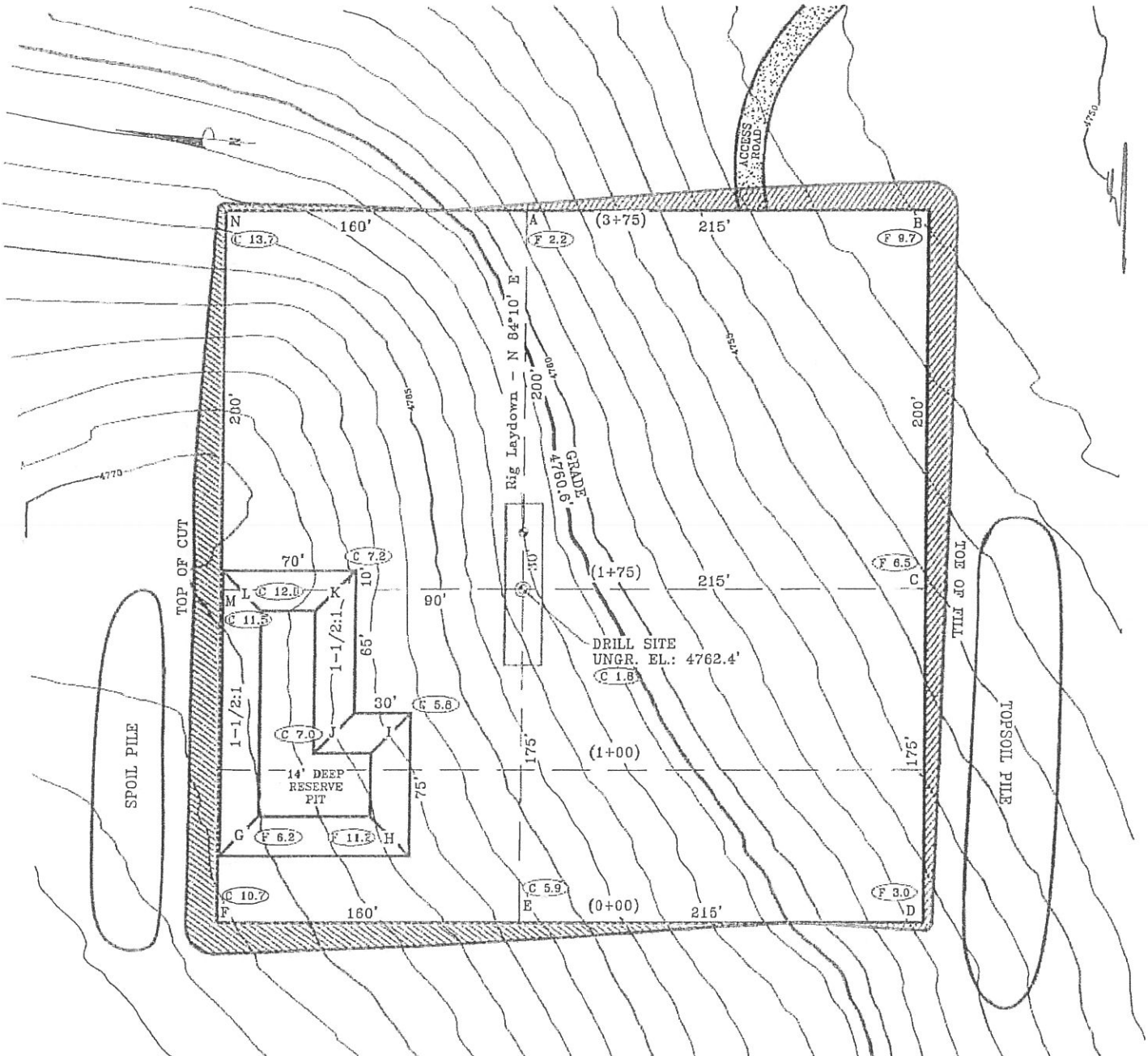
0 2,000 4,000
Feet

CHESAPEAKE OPERATING, INC.

COTTONWOOD DRAW UNIT
38-72 12-1H
MAP C

Scale: 1:24,000	Projection: Wyoming Lambert
Date: 3/4/2011	Land Surveying Incorporated 209 North Works Ave Gillette, WY 82716 LSI

CUT & FILL SHEET



NOTE: PROJECT REPRESENTATIVE FOR CHESAPEAKE OPERATING, INC. REQUESTED THE PAD BE BALANCED TO REDUCE OVERALL CUT AND FILL VOLUMES WHILE MAINTAINING APPROPRIATE SPOIL FOR RECLAMATION PURPOSES. PLEASE NOTE PAD DESIGN SHOWN MAY CALL FOR THE RIG SUBSTRUCTURE TO BE PLACED ON COMPACTED FILL.

DURING PAD LOCATION AND STAKING THE PROJECT REPRESENTATIVE AND SURVEYOR DISCUSSED TOPSOIL AND SPOIL PILE LOCATIONS. THE SHOWN LOCATIONS ARE FOR REFERENCE ONLY AND PROVIDE A VISUAL FOR POTENTIAL PLACEMENT. DUE TO DIFFERENCES IN PAD CONSTRUCTION TECHNIQUES (SCRAPER BUILD vs DOZER PUSH) WE ARE UNABLE TO ACCURATELY PROVIDE TOPSOIL AND SPOIL PILE DIMENSIONS.

Prepared By:

LAND SURVEYING INCORPORATED
209 NORTH WORKS AVENUE
GILLETTE, WYOMING 82716

LSI

Prepared For:

CHESAPEAKE OPERATING, INC.

SCALE: 1" = 80'; CONTOUR INTERVAL: 1'
DRILL SITE UNGRADED ELEVATION: 4762.4'
PROPOSED PAD GRADE: 4760.6'
SLOPES: 1-1/2:1 (UNLESS NOTED)
TOP OF BENCH OR DIKE EL.: 4760.6'
RIG LAYDOWN: N 84°10' E

Location:

COTTONWOOD DRAW UNIT 38-72 12-1H
660' FSL & 1162' FEL
SOUTH & 476' WEST OF CENTER
SE 1/4 SE 1/4 OF SECTION 12,
T 38 N - R 72 W, 6TH P.M.,
CONVERSE COUNTY, WYOMING

Revised EXHIBIT A-5

evision: Pad & Pit Redesign
ate: 09/01/2011 Job #11-054A FILE: 11054AP REF: DB1

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division
Permit Application

Reciprocating Engine Form

GENERAL INFORMATION

Company Name: **RKI Exploration & Production, LLC**

Facility Name: **Cottonwood Draw Unit 12 Pad Genset 1**

ENGINE DATA

Manufacturer: **Cummins**

Model: **QSK60G**

No. of Cylinders: **16**

Compression Ratio: **11.4:1**

Serial Number: **TBD**

Date Ordered: **TBD**

Date Manufactured: **TBD**

Type of Engine:

4 Stroke Cycle: **X** 2 Stroke Cycle:

Fuel Data:

Coal Bed Methane ____ Other: **NG**

Engine Fuel Consumption (BTU/bhp-hr): **6700**

Fuel Gas Heating Value (BTU/scf) **1506**

	Nameplate	Site Rating	Operating Range
Horsepower:	1953	<1953	1953
Speed (rpm):	1800	1800	1800

Exhaust Stack Height (m): 5.2 Diameter (m): 0.3 Temp. (K): 748 Velocity(m/s): 27.8

(Note units)

EMISSIONS DATA

NO_X		CO		VOC		HCHO	
g/hp-hr	lb/hr	g/hp-hr	lb/hr	g/hp-hr	lb/hr	g/hp-hr	lb/hr
0.70	3.01	0.17	0.73	0.48	2.06	0.04	0.17

Annual Operating Hours: 8760

EMISSION CONTROL EQUIPMENT

Lean Burn: X NSCR Catalyst: ____ AFR controller: ____ SCR Catalyst: ____

Oxidation Catalyst: X Other: ____ Describe: ____

Best Available Control Technology control cost analysis attached: yes ____ no X

ADDITIONAL INFORMATION REQUIRED

On separate sheets of paper, attach a copy of engine manufacturer's site rating, site emission estimates, general rating specification for engine model, and documentation of date of order and date of manufacture for each engine.

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division
Permit Application

Reciprocating Engine Form

GENERAL INFORMATION

Company Name: **RKI Exploration & Production, LLC**

Facility Name: **Cottonwood Draw Unit 12 Pad Genset 2**

ENGINE DATA

Manufacturer: **Cummins**

Model: **QSK60G**

No. of Cylinders: **16**

Compression Ratio: **11.4:1**

Serial Number: **TBD**

Date Ordered: **TBD**

Date Manufactured: **TBD**

Type of Engine:

4 Stroke Cycle: **X** 2 Stroke Cycle:

Fuel Data:

Coal Bed Methane ____ Other: **NG**

Engine Fuel Consumption (BTU/bhp-hr): **6700**

Fuel Gas Heating Value (BTU/scf) **1506**

	Nameplate	Site Rating	Operating Range
Horsepower:	1953	<1953	1953
Speed (rpm):	1800	1800	1800

Exhaust Stack Height (m): **5.2** Diameter (m): **0.3** Temp. (K): **748** Velocity(m/s): **27.8**

(Note units)

EMISSIONS DATA

NO_X		CO		VOC		HCHO	
g/hp-hr	lb/hr	g/hp-hr	lb/hr	g/hp-hr	lb/hr	g/hp-hr	lb/hr
0.70	3.01	0.17	0.73	0.48	2.06	0.04	0.17

Annual Operating Hours: **8760**

EMISSION CONTROL EQUIPMENT

Lean Burn: **X** NSCR Catalyst: ____ AFR controller: ____ SCR Catalyst: ____

Oxidation Catalyst: **X** Other: ____ Describe: ____

Best Available Control Technology control cost analysis attached: yes ____ no **X**

ADDITIONAL INFORMATION REQUIRED

On separate sheets of paper, attach a copy of engine manufacturer's site rating, site emission estimates, general rating specification for engine model, and documentation of date of order and date of manufacture for each engine.

RKI Exploration & Production, LLC

Converse County, Wyoming

Cummins QSK60G Electric Generator Set
Lean Burn Engine Equipped with Oxidation Catalytic Convertor

Kw:	1,456	@ 1800 rpm
BHP:	1,953	@ 1800 rpm
Fuel:	1,506	BTU/scf
Fuel Consumption:	6,700	BTU/hp-hr

Fuel Consumption:	8,689	scf/hr
Fuel Consumption:	76.113	mmscf/yr

UNCONTROLLED

	EF g/hp-hr	EF lb/hr	Emissions ton/yr	Remarks
NOx	0.70	3.01	13.19	Cummins spec sheet FR6590
CO	1.74	7.49	32.78	Cummins spec sheet FR6590
VOC	1.00	4.30	18.84	Cummins spec sheet FR6590
PM	0.03	0.14	0.62	Cummins spec sheet FR6590
Formaldehyde	0.34	1.46	6.41	Miratech spec sheet JM-10-0062

CONTROLLED

	EF g/hp-hr	EF lb/hr	Emissions ton/yr	Remarks
NOx	0.70	3.01	13.19	Miratech spec sheet JM-10-0062
CO	0.17	0.73	3.20	Miratech spec sheet JM-10-0062
VOC	0.48	2.06	9.04	Miratech spec sheet JM-10-0062
PM	0.03	0.13	0.57	Cummins spec sheet FR6590
Formaldehyde	0.04	0.17	0.75	Miratech spec sheet JM-10-0062

NOTES:

* Engine is equipped with an Oxidation Catalytic Convertor.
* Fuel consumption and emissions factors derived from Cummins spec sheet.
* Fuel BTU value derived from gas analysis at nearby wellsite.

Input
Calculated

Application & Performance Warranty Data

Project Information

Site Location:	Unknown
Project Name:	QSK60G
Application:	Prime Power
Number of Engines:	1
Operating Hours per Year:	8760

Engine Specifications

Engine Manufacturer:	Cummins
Model Number:	QSK60G
Rated Speed:	1,800 RPM
Type of Fuel:	Natural Gas
Type of Lube Oil:	0.6 wt% sulfated ash or less
Lube Oil Consumption:	< 0.00027 gal/bhp-hr

Engine Cycle Data

Load	Speed	Power	Exhaust Flow	Exhaust Temp.	Fuel Cons.	NO_x	CO	NMHC	NMNEHC	CH_2O	PM_{10}	O_2	H_2O
%		*kW*	*kg/hr*	*C*	*BTU/bhp-hr*	*g/bhp-hr*	*g/bhp-hr*	*g/bhp-hr*	*g/bhp-hr*	*g/bhp-hr*	*g/bhp-hr*	*%*	*%*
100	Rated	1456	8892	475	6700	0.7	1.74	1		0.34		9.47	17

Emission Data (100% Load)

Emission	Raw Engine Emissions						Target Outlet Emissions						Calculated
	g/bhp-hr	*ppmvd @ 15% O2*	*ppmvd*	*lb/MW-hr*	*tons/yr*	*g/kW-hr*	*g/bhp-hr*	*ppmvd @ 15% O2*	*ppmvd*	*lb/MW-hr*	*tons/yr*	*g/kW-hr*	Reduction
NO_x*	0.7	60	117	2.07	13.2	0.939							
CO	1.74	246	477	5.14	32.81	2.333	0.17	24	47	0.5	3.21	0.228	90.2%
NMHC**	1	247	479	2.96	18.86	1.341	0.48	119	230	1.42	9.05	0.644	52%
CH_2O	0.34	45	87	1.01	6.41	0.456	0.04	5	10	0.12	0.75	0.054	88.2%

* MW referenced as NO_2 ** MW referenced as CH_4

System Specifications

NSCR System Specifications (SP-ZCSSK-30x31-8x2/16-XH2B1)

Design Exhaust Flow Rate:	8,892 kg/hr
Design Exhaust Temperature:	475°C
Housing Model Number:	SP-ZCSSK-30x31-8x2/16-HSG
Element Model Number:	ZXS-RE-FULL354XH, ZXS-RE-FULLBLIND
Number of Catalyst Elements:	2
Number of Spare Catalyst Tracks:	1
System Pressure Loss:	5.0 inches of WC (Fresh)
Sound Attenuation:	22-29 dBA insertion loss
Exhaust Temperature Limits:	550 – 1250°F (catalyst inlet); 1350°F (catalyst outlet)

QSK60 Gas, 1800 rpm, 11.4:1, 90°C HT Outlet, 50°C LTR, 0.7 g/hp-hr NOx, Engine Driven Pumps Fitted

Engine Configuration	D843001GX03
CPL	CPL 2671
FR	FR 6590

GENERAL DATA - BASED ON HV FRAME 7 4 POLE ALTERNATOR

Bore	159 mm	Genset Weight With Fluids	15500 kg
Stroke	190 mm	Genset Overall Length	4.89 m
Cylinders configuration	16 V	Genset Overall Height	2.24 m
Cylinder displacement	3.76 litres	Genset Overall Width	2.07 m
Rated speed	1800 rpm	Engine HT Water Volume	181 ltrs
Mean effective pressure	16.1 bar	Engine LT Water Volume	34 ltrs
Compression ratio	11.4:1	Engine Lub Oil Volume	380 ltrs

TECHNICAL DATA - AT CONDITIONS REFERENCED BELOW

Frequency / Engine RPM		60Hz / 1800		Version Date		May 27, 2004
	See Note	Units	100%	80%	75%	50%
General Data						
Effective mechanical output with engine driven pumps	1	kW	1456	1311	1093	728
Generator electrical output	2	kWe	1400	1260	1050	700
Energy input (LHV)		kW	4021	3664	3104	2218
Electrical efficiency	2	%	34.8%	34.4%	33.8%	31.6%
Mechanical efficiency	3	%	36.2%	35.8%	35.2%	32.8%
Heat dissipated in lube oil cooler	4	kW	214	204	195	159
Heat dissipated in LT charge air cooler	4	kW	104	95	86	71
Heat dissipated in HT charge air cooler	4	kW	252	210	141	46
Heat dissipated in block	4	kW	498	462	391	310
Total heat rejected to LT Circuit	4	kW	104	95	86	71
Total heat rejected to HT Circuit	4	kW	963	876	728	518
Unburnt	4	kW	81	75	64	47
Heat radiated to ambient + unaccounted	4	kW	158	155	137	122
Available exhaust heat to ambient temp	4	kW	1258	1152	998	732
Available exhaust heat to 105°C		kW	1043	960	838	623
Fluid Flows						
Intake air flow	4	kg/s	2.39	2.15	1.83	1.25
Exhaust gas flow rate	4	kg/s	2.47	2.23	1.89	1.30
LT circuit water flow rate @ max. external pressure drop	10	m3/hr	28.5	28.5	28.5	28.5
HT circuit water flow rate @ max. external pressure drop	10	m3/hr	83.0	83.0	83.0	83.0
Maximum external pressure drop, HT circuit		bar	1.50	1.50	1.50	1.50
Maximum external pressure drop, LT circuit		bar	1.00	1.00	1.00	1.00
Maximum inlet restriction (airbox, after filter, limit for changing filters)	13	cm H2O	25	20	14	6
Maximum exhaust system back pressure	13	mm H2O	500	400	280	130
Temperatures						
Maximum LT engine water inlet temperature	6	°C	50	50	50	50
LT engine water outlet temperature	6	°C	54	54	54	54
Maximum HT engine water inlet temperature	5	°C	80	80	80	80
HT engine water outlet temperature (thermostat controlled	5	°C	90	90	90	90
Exhaust gas temperature after turbine	7	°C	475	483	493	522
Emissions						
NOx emissions (dry)	4,14	ppm	108	108	106	103
NOx emissions , ISO 8178	4,14	g/hp-hr	0.70	0.70	0.70	0.70
NOx emissions, TALuft	4,14	mg/nm3@5%O2	307	304	301	279
THC emissions (wet)	11	ppm	1068	1113	1124	1210
THC emissions, ISO 8178	11	g/hp-hr	2.74	2.85	2.94	3.27
THC emissions , TALuft	11	mg/nm3@5%O2	1192	1231	1253	1289
CO emissions (dry)	4	ppm	437	431	405	388
CO emissions , ISO 8178	4	g/hp-hr	1.74	1.71	1.65	1.67
CO emissions , TALuft	4	mg/nm3@5%O2	766	744	709	663
CO2 emissions (dry)	4	%	6.41	6.47	6.41	6.70
O2 emissions (dry)	4	%	9.47	9.34	9.44	8.83
PM emissions	4	g/hp-hr	< 0.03	< 0.03	< 0.03	< 0.03
Miscellaneous						
Gas supply pressure range	12	barG	0.24 to 0.50	0.24 to 0.50	0.24 to 0.50	0.24 to 0.50
Minimum methane number	9		75	66	51	42
Minimum static head on LT & HT water cooling circuits		barG	0.5	0.5	0.5	0.5
HT circuit maximum pressure @ engine		barG	3.5	3.5	3.5	3.5
LT circuit maximum pressure @ engine		barG	3.5	3.5	3.5	3.5
Lubricating oil consumption	8	g/kWm-hr	0.15	-	-	-
Timing		deg BTDC	18	18	18	18
Data Point Reference						
PAM reference, performance & efficiency			1887:1888	1889:1890	1891:1892	1893:1894
PAM reference, heat rejection			1887:1888	1889:1890	1891:1892	1893:1894
Report reference (OTR)			0750-2002-023	0750-2002-023	0750-2002-023	0750-2002-023
Heat Balance by % Energy in						
Effective mechanical output with engine driven pumps		kW	1456	1311	1093	728
BMEP		bar	16.1	14.5	12.1	8.0
Energy input (LHV)		kW	4021	3664	3104	2218
Mechanical efficiency		%	36.2	35.8	35.2	32.8
Heat dissipated in LT charge air cooler		%	2.6	2.6	2.8	3.2
Heat dissipated in HT charge air cooler		%	6.3	5.7	4.5	2.2
Heat dissipated in block		%	12.4	12.6	12.6	14.0
Total heat rejected to LT Circuit		%	2.6	2.6	2.8	3.2
Total heat rejected to HT Circuit		%	24.0	23.9	23.4	23.3
Unburnt		%	2.0	2.0	2.1	2.1
Heat radiated to ambient + unaccounted		%	3.9	4.2	4.4	5.5
Available exhaust heat to 105°C		%	25.9	26.2	27.0	28.1
Available exhaust heat to ambient temp		%	31.3	31.4	32.2	33.0
Brake + LT + HT + rad + ub + exh		%	100.0	100.0	100.0	100.0

Engine data subject to change without prior notice and are not contract values.

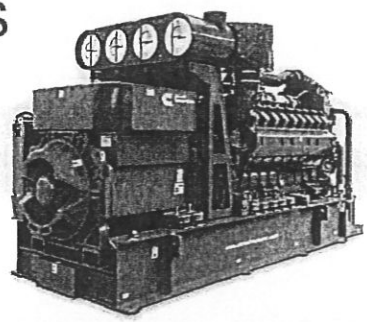
All data taken at CR=12.0.

1) Service conditions according to ISO 8528/1 and reference conditions according to ISO 3046/1:
   COP : Continuous output without time limitation between the stated maintenance intervals - no overload allowed, parallel operation with the grid.
   Reference conditions : altitude 152 metres, suction air temperature 25°C, LT. cooling water inlet temperature 50°C, methane index >=90
   Minimum starting temperature: 10°C without pre heat and -5°C with pre heat of water and intermittent pre lube
   Minimum compressor inlet temperature at load: 0°C
2) Generator efficiency = 96.1% is assumed
3) Tolerance on engineering supplied 1500 rpm brake efficiency data is ± 0.3% BTE
4) Tolerance ±5%.
5) Outlet: 90°C maximum allowed. Inlet: for information only, design heat exhanger with 5°C margin below the data shown.
   Data taken with with 50% of glycol and with outlet T at max allowed.
6) Inlet: maximum temperature allowed. Outlet: for information only, data taken with 50% of glycol and with max allowed inlet T.
7) With air intake at 25°C. Tolerance ± 10°C.
8) At full load (fh for information, with lubricating oil density = 0.83).
9) Includes 5 MN production margin. See 1800_derate sheet.
10) Maximum flow with open thermostats.
11) Tolerance ±15%. For pipline natural gas, non-methane hydrocarbons are 2-6% of total hydrocarbons
12) At inlet to fuel shut-off valve, with 50 MJ/kg gas. See 1800_derate sheet
13) Restrictions based on 25 cm H2O / 500 mm H2O at full load, and they will decrease as shown at part load
14) Estimated from performance data at higher and lower emissions

Lean-burn gas generator sets

> 1000–1400 kW | QSK60G series

> 1250–2000 kW | QSV91G series



Our energy working for you.™

Cummins Power Generation

Standard features

Single source responsibility

Design, manufacture and testing of engine, alternator, control system and complete generator set are all provided by Cummins.

Alternator

- Brushless, self-excited machine
- Close voltage regulation
- Rotor and exciter impregnated with oil and acid resisting resin
- Exceptional short circuit capability
- Low waveform distortion with non linear loads

Applications

- Combined heat and power (CHP)
- Utility peaking
- Waste gases
- Prime power in remote areas

Cummins engine

- Heavy duty 4 cycle water cooled engine
- High fuel efficiency
- NOx exhaust emissions as low as 0.5g/hp-hr (250mg/Nm^3)
- MCM700/SSM558 full authority electronic management
- Woodward PROACT actuator to drive throttle valve
- CENSE engine monitoring system

PowerCommand® 3.3

- Full paralleling capability grid and load share
- Integrated voltage regulation
- Superior alternator and generator set protection system
- AmySentry™ alternator protection
- 320 x 240 pixel, multipe lauguages supported operator display panel

Lean-burn gas generator sets | Technical data

60 Hz	Generator Set	Engine	BMEP	Bore	Stroke	Capacity	Configuration	RPM
1000 kWe	C1000N6C	QSK60G	17.3 Bar(g)/ 250 psi	159 mm/ 6.2 in	190 mm/ 7.48 in	60 liters/ 3683 in³	16 V	1200 rpm
1100 kWe	C1100N6C	QSK60G	19 Bar(g)/ 276 psi	159 mm/ 6.2 in	190 mm/ 7.48 in	60 liters/ 3683 in³	16 V	1200 rpm
1400 kWe	C1400N6C	QSK60G	16 Bar(g)/ 232 psi	159 mm/ 6.2 in	190 mm/ 7.48 in	60 liters/ 3683 in³	16 V	1800 rpm
1250 kWe	C1250N6C	QSV91G	14 Bar(g)/ 203 psi	180 mm/ 7.09 in	200 mm/ 7.88 in	91 liters/ 5053 in³	18 V	1200 rpm
1750 kWe	C1750N6C	QSV91G	16 Bar(g)/ 232 psi	180 mm/ 7.09 in	200 mm/ 7.88 in	91 liters/ 5053 in³	18 V	1514 g/box rpm
2000 kWe	C2000N6C	QSV91G	18.2 Bar(g)/ 264 psi	180 mm/ 7.09 in	200 mm/ 7.88 in	91 liters/ 5053 in³	18 V	1514 g/box rpm

50 Hz	Generator Set	Engine	BMEP	Bore	Stroke	Capacity	Configuration	RPM
995 kWe	C995N5C	QSK60G	13.8 Bar(g)/ 200 psi	159 mm/ 6.2 in	190 mm/ 7.48 in	60 liters/ 3683 in³	16 V	1500 rpm
1160 kWe	C1160N5C	QSK60G	16 Bar(g)/ 232 psi	159 mm/ 6.2 in	190 mm/ 7.48 in	60 liters/ 3683 in³	16 V	1500 rpm
1200 kWe	C1200N5C	QSK60G	16.6 Bar(g)/ 240 psi	159 mm/ 6.2 in	190 mm/ 7.48 in	60 liters/ 3683 in³	16 V	1500 rpm
1400 kWe	C1400N5C	QSK60G	19.4 Bar(g)/ 281 psi	159 mm/ 6.2 in	190 mm/ 7.48 in	60 liters/ 3683 in³	16 V	1500 rpm
1540 kWe	C1540N5C	QSV91G	14 Bar(g)/ 203 psi	180 mm/ 7.09 in	200 mm/ 7.88 in	91 liters/ 5053 in³	18 V	1500 rpm
1750 kWe	C1750N5C	QSV91G	16 Bar(g)/ 232 psi	180 mm/ 7.09 in	200 mm/ 7.88 in	91 liters/ 5053 in³	18 V	1500 rpm
2000 kWe	C2000N5C	QSV91G	18.2 Bar(g)/ 264 psi	180 mm/ 7.09 in	200 mm/ 7.88 in	91 liters/ 5053 in³	18 V	1500 rpm

Our energy working for you.™
www.cumminspower.com

F-1414 (10/09) UK

Power Generation

STATE OF WYOMING

Department of Environmental Quality - Air Quality Division
Oil and Gas Production Facilities C6 S2 Permit Application

EMISSION SUMMARY

Company Name: RKI Exploration & Production, LLC

Facility Name: Cottonwood Draw Unit 12 Pad Genset

This form must be completed for each emission source at the facility. A list of the emission sources which must be considered is found in Appendix B of the C6 S2 O&G Production Facilities Permitting Guidance.

UNCONTROLLED EMISSIONS (Tons Per Year)

These are the total uncontrolled, potential emissions from each source.

EMISSION SOURCE (i.e., tank, natural gas-fired heater, reboiler still vent, glycol flash separator, pneumatic pump, separator gas vent, water knockout vent, etc.)	VOCs	total HAPs	NO_X	CO	SO_2	H_2S
Cummins QSK60G Genset	18.84	6.41	13.19	32.78	-	-
Cummins QSK60G Genset	18.84	6.41	13.19	32.78	-	-
A-14071 (Wellsite Facilities)	927.01	40.58	15.57	12.85	-	-

CONTROLLED EMISSIONS (Tons Per Year)

These are the total emissions from each source. Include controlled emissions from each controlled source and uncontrolled emissions from each source which does not require control, such as process equipment burners.

EMISSION SOURCE	VOCs	total HAPs	NO_X	CO	SO_2	H_2S
Cummins QSK60G Genset	9.04	0.75	13.19	3.20	-	-
Cummins QSK60G Genset	9.04	0.75	13.19	3.20	-	-
A-14071 (Wellsite Facilities)	27.36	0.13	7.43	4.13	-	-

HAZARDOUS AIR POLLUTANT SUMMARY (Tons Per Year)

Complete this section for each emissions source if TOTAL HAPs from that source are 9 TPY or greater.

SOURCE	Benzene	Toluene	Ethyl-Benzene	Xylenes	Other

TRINITY SERVICES & CONSULTING
609 S. Kelly Avenue, Suite F-3 Edmond, OK 73003 Phone 405-285-7720

November 6, 2014

State of Wyoming
Department of Environmental Quality
Air Quality Division
122 W. 25th Street
Herschler Building 2E
Cheyenne, WY 82002
Attn: Nathan Henschel

RE: RKI Exploration & Production, LLC
Modeling for Four Compressor Stations

Dear Mr. Henschel:

On behalf of RKI Exploration & Production, LLC (RKI), Trinity Services & Consulting, LLC (TSC) is pleased to prevent modeling reports for the four stations listed below:

- Cottonwood Draw Unit 12 Generators; Section 12, T38N, R72W
- Crow Unit 19 Generators; Section 19, T36N, R69W
- Herron 36-71-1 Generators; Section 1, T36N, R71W
- Robbins Unit 26 Generators; Section 26, T36N, R72W

Thank you for your assistance with this. If you have any question, please contact me at the (405) 285-7720 or Mr. Jeff Ingerson at (405) 987-2181 if you have further questions.

Sincerely,
TRINITY SERVICES & CONSULTING

Vern Choquette
Vice President
Environmental & Regulatory Affairs

cc: RKI – Charles Ahn
RKI – Jeff Ingerson

Attachments: Electronic Modeling Files on CDs

TRINITY SERVICES & CONSULTING
ENVIRONMENTAL EXCELLENCE

Dispersion Modeling Report

For:

RKI Exploration & Production, LLC

Cottonwood Draw Unit 12 Generators
Section 12, T38N, R72W
Converse County, Wyoming

November 4, 2014
Project Number: 0214P008

Prepared for:

RKI Exploration & Production, LLC
210 Park Avenue, Suite 900
Oklahoma City, Oklahoma 73102
Attn: Jeff Ingerson

Prepared by:

Vice President
Environmental & Regulatory Affairs

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LIST OF APPENDICES

DISPERSION MODELING ANALYSIS

1.0 INTRODUCTION

RKI Exploration and Production, LLC (RKI) has installed a new oil and gas production facility natural gas compression station in Converse County, Wyoming. The site will also include up to two (2) natural-gas fired engines driving 1,456 kW generators. The Wyoming Department of Environmental Quality (WDEQ) has requested a modeling analysis to demonstrate that the emissions from the facility will not or contribute to a violation of the National Ambient Air Quality Standards (NAAQS), Prevention of Significant Deterioration (PSD) Class II Increment consumption requirements, or state standards (for Formaldehyde).

1.1 Results Summary

Modeling was conducted for NAAQS and PSD Class II Increment Consumption for for NO_2, and formaldehyde state standards. As described in Section 4 of this report, this modeling analysis demonstrates that operation of the facility described in this report neither causes nor contributes to exceedances of applicable air quality standards.

2.0 DESCRIPTION OF MODELED FACILITIES

2.1 Geographic Location

The Cottonwood Draw Unit 12 Generators are located approximately 10 miles northwest of Bill, Wyoming on the west side of Highway 59. The UTM Coordinates for the center of the facility are Zone 13, 463,958 meters East and 4,791,676 meters North (WGS 84 datum) at an elevation of approximately 1,455 meters above mean sea level.

2.2 Terrain

Terrain in the area of the Cottonwood Draw Unit 12 Generators is both Simple and Complex. Recent changes in the USGS National Elevation Dataset (NED) files have made them incompatible with EPA's AERMAP processor. Therefore, TSC used USGS 1 arc-second DEM files for the terrain data (attached).

2.3 Land Use

The Cottonwood Draw Unit 12 Generators are located in a rural area, so rural dispersion coefficients will be used.

3.0 MODELING INPUTS

AERMOD Version 14134 was used for this dispersion model analysis. The model was run in Regulatory Default mode with the following options:

- Final plume rise and stack heights adjusted for stack-tip downwash and buoyancy-induced dispersion.
- Regulatory default values for wind-profile exponents and vertical potential temperature.
- Rural dispersion coefficients (based on the land-use surrounding the facility).
- Short-term ground-level concentrations occurring during calm-wind conditions, are calculated using the calm-processing feature.
- The model takes into account gradual plume rise when sources are subject to building wake effects.
- Building downwash -- to consider the effect of buildings close to the emission sources.
- Simple and complex terrain because surrounding terrain is not flat.
- No flagpole option – receptor elevations are evaluated at ground level.

As the site is located in a rural area, rural dispersion coefficients will be implemented via the use of the RURAL keyword. No downwash analysis was conducted because there are not structures located within the area of influence.

3.1 Meteorological Data

The analysis used 5 years of met data (2008 to 2012) for the Douglas-Converse County Airport near Douglas, Wyoming, obtained from the WDEQ. Upper-air data consisting of twice-daily soundings from the nearest upper-air monitoring station (Riverton, Wyoming) were merged with the surface meteorological data.

3.2 Receptor Grid

Receptors were placed around the facility using UTM coordinates in rectangular Cartesian arrays as follows:

- 50-meter (m) spacing along the ambient boundary/facility fenceline;
- 100-m spacing from the ambient boundary to a distance of 1.0 kilometer (km) from the grid origin;
- 500-m spacing from 1.0 km to 5.0 km; and
- 1000-m spacing from 5.0 km to 10.0 km.

3.3 Source Terms

VOC is not a modeled pollutant. The only modeled point sources at the Station are the natural gas fired electrical generators. The Stack Parameters and Emission Rates are shown in Table 3-1.

Table 3-1 Generator Engines Stack Parameters and Emission Rates

Stack ID	Stack Height (m)	Stack Diameter (m)	Exit Velocity (m/s)	Temp (°K)	NO_2 (lb/hr)	HCHO (lb/hr)
GEN1	5.2	0.3	45.83	748	3.01	0.17
GEN2	5.2	0.3	45.83	748	3.01	0.17

4.0 MODELING RESULTS

4.1 Significant Impacts Analysis

Based on previous modeling at similar facilities, TSC did not conduct a modeling for the Significant Impact Levels (SILs) for $PM10/_{2.5}$, CO, or SO_2 because the predicted concentrations are considerably less than the SILs. Likewise, modeling was not conducted for the 1-hour NO_2 because the compressor station is a minor source. The predicted concentration of annual NO_2 was greater than the SIL, so additional modeling with surrounding sources was conducted. Model inputs for the surrounding sources were obtained from the WDEQ on September 11, 2014.

4.2 WAAQS NO_2/Formaldehyde Analysis

TSC used the surrounding sources (supplied by the WDEQ), plus an ambient background concentration of 14 $\mu g/m^3$ to determine compliance with the WAAQS standards for NO_2. The modeled first-high values were used with no NO_x to NO_2 conversion ratio for additional conservatism. Results are shown in Table 4-1.

Table 4-1 Modeled NO_2 Concentrations

Pollutant	Avg Period	2008	2009	2010	2011	2012	High	Back	Total	WAAQS Standard
All results reported in micrograms per cubic meter ($\mu g/m^3$)										
NO_2	Annual	7.8	7.7	8.0	8.7	7.8	8.7	14.0	22.7	99

As the results in Table 4-1 indicate, the modeled concentrations plus background do not exceed the WAAQS for NO_2. TSC also modeled the associated incremental cancer risk due to long-term exposure to formaldehyde emissions. There is no regulatory standard for formaldehyde. However, TSC conducted a cumulative formaldehyde risk assessment from source emissions plus nearby/regional sources supplied by the WDEQ. It should be noted that the maximum NO2 and Formaldehyde concentrations occur nearly 10 kilometers from the proposed source (near the PRCC Compressor Station). The Results are shown in Table 4-2.

Table 4-2 Modeled HCHO Concentrations

Pollutant	Avg Period	2008	2009	2010	2011	2012	High	10^6 Risk	Project Risk
All results reported in micrograms per cubic meter ($\mu g/m^3$)									
HCHO	Annual	0.8	0.8	0.8	0.9	0.8	0.9	0.000013	1/15

4.3 PSD Increment Analysis

PSD Class II Increment Consumption for PM_{10} was conducted using all sources within 51.5 km. PM_{10} receptors for this analysis were limited to those that exceeded the SILs. Results are shown in Table 4-3.

Table 4-3 Class II Increment Modeled Concentrations

Pollutant	Averaging Period	2008	2009	2010	2011	2012	Highest	Class II Increment
All results reported in micrograms per cubic meter (µg/m³)								
NO_2	Annual	7.8	7.7	8.0	8.7	7.8	8.7	25

As the results in Table 4-3 indicate, the modeled concentrations for NO_2 do not exceed the Class II Increment.

4.4 Class I Area Analysis

Since the nearest Class I area (Wind Cave, South Dakota) is located more than 50 km from the facility, the Class I Area analysis is not applicable.